



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

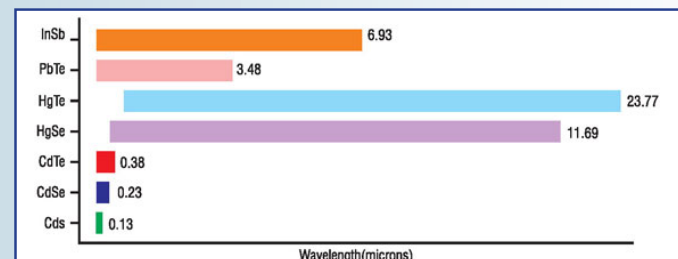
[A satellite defense system based on quantum dot technology](#)

[Nanowerk, 23JAN2012](#)

Raytheon Company has developed a counter measure system using quantum dots to protect space assets such as satellites from missile attacks. They have developed a decoy consisting of quantum dots of different sizes and shapes that are engineered to emit radiation having a radiation profile similar to that of the asset.

TECHINICAL ARTICLE: N. Mintz, M. Skidmore and K. Spariosu, Countermeasure System and Method using Quantum Dots, Patent No: US 7916065 B1, Date of Patent: March 29, 2011

Tags: Quantum science, Military technology, Space technology, Featured Article



Emission range of various quantum dot materials: Left end of each bar represents the resonant emission peak corresponding to a quantum dot of 3 nm size and the right end corresponds to the same material in bulk. NANOWERK

[Science and Engineering Indicators 2012](#)

[NSF, 18JAN2012](#)

This biennial volume provides a broad base of quantitative information on the U.S. and international science and engineering enterprise. Supporting appendix tables are available in spreadsheet format. Accompanying SEI 2012 are the interactive Science and Engineering Indicators Digest and the redesigned State Data Tool, which provides a wealth of information on science and technology infrastructure by state and allows in-depth exploration of these data.

Tags: STEM, Featured Article

ADVANCED MATERIALS

[Sandia chemists find new material to remove radioactive gas from spent nuclear fuel](#)

[EurekAlert, 24JAN2012](#)

Researchers have used metal-organic frameworks (MOFs) to capture and remove volatile radioactive gas from spent nuclear fuel. "This is one of the first attempts to use a MOF for iodine capture," said chemist Tina Nenoff. The process also reduces the volume of high-level wastes. The research could impact worldwide efforts to produce clean, safe nuclear energy and reduce radioactive waste.

Tags: Advanced materials

[Graphene is "invisible" to water](#)

[Nanowerk, 23JAN2012](#)

Engineering researchers at Rensselaer Polytechnic Institute and Rice University coated pieces of gold, copper, and silicon with a single layer of graphene, and then placed a drop of water on the coated surfaces. Surprisingly, the layer of graphene proved to have virtually no impact on the manner in which water spreads on the surfaces.

Tags: Advanced materials

[Buckyballs for next-generation spintronics devices](#)

[Nanowerk, 20JAN2012](#)

Buckyballs sandwiched between two magnetic materials have very little effect on electron spin. This enables them to store spin information for much longer periods of time than silicon. Depending on the orientation of the magnetic field in the upper and lower layers of magnetic material, electrons with the same direction of spin are either allowed through or held back, as if a valve were being opened or closed. This would make it possible to create sensitive magnetic sensors.

Tags: Advanced materials, Quantum science, Sensors

[Giant magnetoresistance emerged from non-magnetic phase-change solid-state memory](#)

[Nanowerk, 20JAN2012](#)

Scientists have discovered that a superlattice phase-change

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film multilayered using germanium-tellurium alloy sub-layers and antimony-tellurium alloy sub-layers with aligned orientation axes has a magnetoresistance effect in excess of 2000% in a temperature range from room temperature to around 150 C. The developed superlattice phase-change films are expected to be employed in new devices going beyond memory devices, for example in readout-heads for next-generation hard disk drives.

Tags: Advanced materials, Materials science, S&T Japan

AUTONOMOUS SYSTEMS & ROBOTICS

Researchers find critical speed above which birds- and drones- are sure to crash

[PhysOrg.com](#), 19JAN2012

While speed is a goshawk's greatest asset, researchers at MIT say the bird must observe a theoretical speed limit if it wants to avoid a crash. The researchers found that, given a certain density of obstacles, there exists a speed below which a bird—and any other flying object—has a fair chance of flying collision-free. Any faster, and a bird or aircraft is sure to smack into something, no matter how much information it has about its environment.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

Victory for crowdsourced biomolecule design

[Nature News](#), 22JAN2012

Players of the online game Foldit guide researchers to a better enzyme. The researchers have previously reported successes by Foldit players in folding proteins, but the latest work moves into the realm of protein design, a more open-ended problem. By posing a series of puzzles to Foldit players and then testing variations on the players' best designs in the lab, researchers have created an enzyme with more than 18-fold higher activity than the original.

Tags: Biotechnology

High-power, 532 nm-wavelength compact green laser module with high efficiency, high-speed modulation capability

[PhysOrg.com](#), 19JAN2012

A Japanese company has confirmed green light output of greater than 100 mW under CW (Continuous wave) conditions and high-speed modulation of more than 100 MHz. This module shows promise for a wide range of applications such as fluorescence microscopes or spectral analysis in life science or biomedical applications, and precise measurements as well as nondestructive inspections in industry, and in consumer electronics.

Tags: Biotechnology

COMMUNICATIONS TECHNOLOGY

Researchers produce ultra-short light pulses using on-chip microresonator

[PhysOrg.com](#), 19JAN2012

Researchers from the NIST Center for Nanoscale Science and Technology and Purdue University have designed and fabricated an on-chip microresonator that converts continuous laser light into ultra-short pulses consisting of a mix of well-defined frequencies, a technology with applications in advanced sensors, communications systems, and metrology.

Tags: Communications Technology, Government S&T

ENERGY

Chip Solar House is powered by the sun and controlled through Xbox Kinect

[Digital Trends](#), 23JAN2012

A solar powered house you control with the flick of your wrists? It might sound like something you would see in a science fiction film, but thanks to the collaborative efforts of Caltech and SCI-Arch it is now a reality. The house measures 750-square feet and took over two years, more than 100 students, and \$1 million to build—however according to SCI-Arch and Caltech, the house could be replicated for as little as \$300,000. So while being green might be easy, it isn't exactly cheap. CHIPS (Compact, Hyper-Insulated Prototype Solar House)

Tags: Energy, Science without borders

DOE to spur construction of small modular nuclear reactors

[R&D Magazine](#), 20JAN2012

Through a draft Funding Opportunity Announcement (FOA) announced Friday, the Department of Energy plans to establish cost-shared agreements with private industry to support the design and licensing of small modular nuclear reactors (SMRs). About one-third the size of current nuclear plants, SMR are expected to be safer and cheaper to build and operate.

Tags: Energy, Nuclear energy

Scientists design solar cells that exceed the conventional light-trapping limit

[PhysOrg.com](#), 20JAN2012

A team of scientists in CalTech has outlined designs for solar cells that can absorb light from the entire solar spectrum yet are as little as 10 nanometers thick. The new design approach, which could lead to improved low-cost solar cells, requires overcoming a thermodynamic light-trapping limit proposed in the 1980s.

Tags: Energy, Advanced materials, Solar energy

“There is no harm in doubt and skepticism, for it is through these that new discoveries are made.”

RICHARD FEYNMAN

Biofuel from beneath the waves

[Nature News, 19JAN2012](#)

Engineered bacterium can produce ethanol directly from seaweed. Researchers in California isolated a biochemical pathway that breaks down alginate. They inserted the genes responsible into a strain of *E. coli*, which could then digest the alginate into simple sugars. The team also engineered the strain so that it could convert those sugars into ethanol, enabling the direct production of ethanol from brown seaweed.

Tags: Energy, Alternate energy, Ocean science

FORECASTING

12 Topics To Watch in 2012

[Aviation Week, 23JAN2012](#)

It's time to move on to 2012 and the next round of big developments in the aerospace and defense industry.

Tags: Forecasting, Aerospace technology

Reviewing Predictions of the year 2000 made in 1900 - Part 1

[Next Big Future, 21JAN2012](#)

John Elfreth Watkins, Jr. made 29 predictions in 1900 of what may happen in the next 100 years. Here we will review what was right, what was too optimistic and what was too pessimistic. [Part 2](#), [Part 3](#)

Tags: Forecasting, Science without borders

Yahoo Predicts America's Political Winners

[Technology Review, 20JAN2012](#)

Data scientists at Yahoo are using prediction markets—along with polls, sentiment analysis on Twitter, and trends in search queries—to create the mother of all political prediction engines. The project involves Web-based prediction markets like Intrade, in which large numbers of people bet on the outcomes of elections.

Tags: Forecasting

GOVERNMENT S&T

Military's New Plan to Weed Out Counterfeits: Plant DNA

[Wired, 19JAN2012](#)

Researchers at Applied DNA Sciences Inc. have figured out how to create unique DNA “signatures” out of plant genomes. A DNA-marked coating can then be applied to just about anything, from circuit boards to microchips to routers. Once embedded, the DNA can be detected in one of two ways: A handheld scanner that can instantly spot the DNA strand, or a forensic analysis that requires a swab of the mark. So as a product moves through the

supply chain, it'd be checked for authenticity every step of the way.

Tags: Government S&T

USAF Ranks Last In Pentagon Testing Scorecard

[Aviation Week, 18JAN2012](#)

DOT&E chief J. Michael Gilmore writes that of the 311 Major Defense Acquisition Programs that his office scrutinized in fiscal 2011, 67 experienced either significant delays and/or Nunn-McCurdy breaches, with thirty-six actually breaching Nunn-McCurdy cost-growth caps. [DOT&E FY 2011 Annual Report](#)

Tags: Government S&T

INFORMATION TECHNOLOGY

Tabletop Computer Knows You by Your Shoes

[MIT Technology Review, 23JAN2012](#)

New research from the Hasso Plattner Institute in Potsdam, Germany, aims to quell the frustration and strife that can come when multiple people use a single touch screen. The project, called Bootstrapper, uses cameras below a table to identify different users by their shoes. Each set of shoes is linked to an account that keeps track of a person's actions and preferences.

Tags: Information Technology

Twitter Bots Create Surprising New Social Connections

[MIT Technology Review, 23JAN2012](#)

Researchers show how simple programs posing as real people can shape interactions on Twitter. The work has its origins in meetings of the Web Ecology Project, an independent research group focused on studying the structure and dynamics of social media phenomena.

Tags: Information Technology

GLocal Integrated Design Environment

[NASA STI, 20JAN2012](#)

The GLocal Integrated Design Environment (GLIDE) is a collaborative engineering application built to resolve the design session issues of real-time passing of data between multiple discipline experts in a collaborative environment. Utilizing Web protocols and multiple programming languages, GLIDE allows engineers to use the applications to which they are accustomed.

Tags: Information Technology, NASA

Google experiments with site logins using your phone and a QR code

[Digital Trends, 19JAN2012](#)

Here's how it works: You point a web browser to accounts.google.com/sesame, where a QR code is displayed. Using

continued...

your smartphone, which should be logged into your Google account, and a QR reader, scanning the code prompts an authorization window to appear. When approved, the computer then opens your Google account.

Tags: Information Technology, Cyber Security

World's longest superconductor cable

[PhysOrg.com](#), 19JAN2012

The “AmpaCity” project [supported by the German government] could herald a whole new dimension in the restructuring of inner-city networks. It would be possible to install 10 kV superconducting links in large sections of the backbone of the Essen distribution network. This would lead to greater efficiency as well as lower operating and maintenance costs while simultaneously reducing land use.

Tags: Information Technology

MATERIALS SCIENCE

New insight into how metals fail

[Nanowerk](#), 23JAN2012

Cornell engineers, trying to better understand this process, have discovered that nanoscale voids behave differently than the larger ones that are hundreds of thousands of atoms in scale, studied through traditional physics. This insight could lead to improved ability to predict how cracks grow in metals, and how to engineer better materials.

Tags: Materials science

Bomb-proof textiles take off

[EUROPA](#), 19JAN2012

Researchers have developed a textile container designed to prevent the effects of small bombs hidden inside luggage which is then carried in aircraft cargo holds. The container has been constructed with a combination of different layers of technical textiles. Each has its own characteristics. Some textiles have been positioned in different places to withstand the penetration of fragments flying out during the explosion. Some other textiles have been designed to be able to expand in a controlled way so the container can stretch without tearing itself apart.

Tags: Materials science

MICROELECTRONICS

A big leap toward lowering the power consumption of microprocessors

[PhysOrg.com](#), 20JAN2012

The first systematic power profiles of microprocessors could help lower the energy consumption of both small cell phones and giant data centers, report computer science professors from the University of Texas at Austin and the Australian National University. Their results may point the way to how companies like Google, Apple, Intel and Microsoft can make software and hardware that will lower the energy costs of very small and very large devices.

Tags: Microelectronics, Energy

Research team creates photoelectrowetting circuit

[PhysOrg.com](#), 20JAN2012

Researchers in France have built a circuit using a phenomenon known as photoelectrowetting, which allows a switch to be turned on by shining a light on it. The circuit is made by using the principle of electrowetting to cause a drop of water to thin resulting in a conducting cantilever to fall towards a second conducting material allowing current to pass through. TECHNICAL ARTICLE: “Actuation at a distance” of microelectromechanical systems using photoelectrowetting: proof-of-concept, Authors: Matthieu Gaudet, Steve Arscott

Tags: Microelectronics

NEUROSCIENCE

Startup Makes ‘Wireless Router for the Brain’

[MIT Technology Review](#), 23JAN2012

Kendall Research’s devices could make optogenetics research much more practical. Optogenetics has been hailed as a breakthrough in biomedical science—it promises to use light to precisely control cells in the brain to manipulate behavior, model disease processes, or even someday to deliver treatments.

Tags: Neuroscience, Biotechnology, Medical Sciences

QUANTUM SCIENCE

A conclusive test for ‘spooky action at distance’

[KurzweilAI](#), 19JAN2012

University of Vienna researchers have proposed the first conclusive experimental test of “Bell’s theorem” (“Bell’s inequality”) — that measuring a particle can instantly influence another quantum-entangled particle arbitrarily far away. The researchers say they have succeeded in devising a new “Bell test” (of this theorem), taking into account the decay property of high-energy particles systems, called kaon-antikaon systems. Revealing “spooky action at distance” (Albert Einstein’s phrase) for kaon-antikaon pairs has fundamental implications for our understanding of such particles’ correlations and could ultimately allow us to determine whether symmetries in particle physics and manifestations of particles’ correlations are linked. TECHNICAL ARTICLE: Revealing Bell’s Nonlocality for Unstable Systems in High Energy Physics, Hiesmayr B. C. et al.

Tags: Quantum science

Quantum mechanics enables perfectly secure cloud computing

[PhysOrg.com](#), 19JAN2012

Researchers in Austria have succeeded in combining the power of quantum computing with the security of quantum cryptography and have shown that perfectly secure cloud computing can be achieved using the principles of quantum

mechanics. They have performed an experimental demonstration of quantum computation in which the input, the data processing, and the output remain unknown to the quantum computer.

Tags: Quantum science, Cyber Security

SCIENCE WITHOUT BORDERS

World-class scientists chosen for HHMI's first International Early Career award

[EurekAlert, 24JAN2012](#)

The 28 recipients represent a wide range of disciplines, from neuroscience to virology to plant science. All the awardees were trained in the United States as a graduate student or a postdoctoral fellow. "These are the people who, 10 years from now, we expect will be the scientific leaders in their countries," HHMI President Robert Tjian says. The countries with the most IECS awardees are China (7), Portugal (5), and Spain (5), but recipients are also based in nine other countries: Argentina, Brazil, Chile, Hungary, India, Italy, Poland, South Africa, and South Korea. Nine of the 28 (32 percent) are women. Scientists from 18 countries were eligible to apply, and HHMI received 760 applications.

Tags: Science without borders, STEM

hydrogen cyanide, ammonia and water.

Tags: Science without borders

Third issue of the Journal of Unsolved Questions now available

[Nanowerk, 23JAN2012](#)

The journal's goal is to provide a forum through which information can be made available on the kind of excellent but inconclusive scientific projects that established scientific journals tend to ignore. *Journal of Unsolved Questions*

Tags: Science without borders

China plans to launch 21 rockets, 30 satellites this year

[Space Daily, 20JAN2012](#)

The China Aerospace Science and Technology Corp. (CASC) said that the company will strive to ensure the success of all launch missions, including the launch of the Shenzhou-9 spacecraft, which will achieve space rendezvous and docking missions with the orbiting Tiangong-1 vehicle. According to the company's plan for 2011-2015, it will complete 100 launch missions and send 100 satellites into space in the five-year period.

Tags: Science without borders, China, Space technology

Barn owl wing adapted for stealth

[BBC News, 19JAN2012](#)

Researchers in Germany have revealed that the secret of a barn owl's ability to fly and hunt noiselessly is in the shape and structure of its wings. The wings' most important features, they explained, were the high curvature or "camber" of the wings. This curvature means that each wing beat produces more lift. This is because the air flow is accelerated over the upper surface of the curved wing. So the pressure drops and the wing is sucked upwards into the lower pressure on the upper wing surface.

Tags: Science without borders, Biomimetics, Stealth technology

NAS Honors 17 for Major Contributions to Science

[The National Academies, 19JAN2012](#)

The National Academy of Sciences will honor 17 individuals with awards in recognition of their extraordinary scientific achievements in a wide range of fields spanning the physical, biological, and social sciences.

Tags: Science without borders

New tech puts interactive apps on car windows

[Digital Trends, 19JAN2012](#)

As part of their "Windows of Opportunity" project, GM challenged researchers and students at Bezalel Academy of Art and Design in Israel to come up with ways to give backseat passengers a more enriching experience on the road. And rise to the challenge they did, creating an entire set of apps that use interactive display windows to make road trips an educational, fun, and yes, social experience.

Tags: Science without borders

FEATURED RESOURCE

Foldit

Foldit is a revolutionary new computer game enabling you to contribute to important scientific research. The current series of Science Puzzles and Grand Challenges are meant to generate the evidence needed to prove that human protein folders can be more effective than computers at certain aspects of protein structure prediction. The more interesting goal for Foldit is protein design. There aren't a lot of automated approaches to protein design, so Foldit's human folders will have less competition from the machines. [RSS](#)

Impossible chemistry: Quantum escape tunnel

[New Scientist, 23JAN2012](#)

Space is too cold for most chemical reactions—but they happen all the same. Most chemical reactions proceed through the formation of high-energy intermediate molecules, which then rearrange themselves into lower-energy products. Energy, usually in the form of heat, is needed to get the reactants over this barrier. In the 1970s, a Soviet chemist named Vitali Goldanski challenged that dogma. Goldanski suggested that in the frigid environment of space, tunnelling keeps things going - perhaps even allowing the molecular building blocks of life to assemble on interstellar dust grains from simple ingredients such as

World's Top 10 S&T Achievements in 2011 [according to CAS]

Chinese Academy Of Sciences, 18JAN2012

World's top 10 science and technology achievements in 2011 were unveiled Tuesday, as chosen by academicians at the Chinese Academy of Sciences and the Chinese Academy of Engineering.

Tags: Science without borders, S&T China

SENSORS

BAE Systems Launches High-Definition Scientific CMOS Image Sensor

BAE Systems, 24JAN2012

Among its key technology features, the CIS1021 image sensor offers more than 88dB of intra-scene dynamic range, captures images in an industry-standard 1920 x 1080 HDTV format, and is available in either a monochrome or color version. Unlike competing sensors, the CIS1021 combines these multiple capabilities into a single sensor and allows scientists to capture all the data in a scene, from the faintest to the brightest target in an image.

Tags: Sensors, Imaging Technology

Air Force's Top Brain Wants a 'Social Radar' to 'See Into Hearts and Minds'

Wired, 19JAN2012

Militaries developed "Sonar to see through the water, Radar to see through the air, and infrared tech to see through the night," the Air Force's chief scientist, Dr. Mark Maybury, notes. "Well, we also want to see into the hearts and the minds of people." But Social Radar won't be a single sensor to discover your secret yearnings. It'll be more of a virtual sensor, combining a vast array of technologies and disciplines, all employed to take a society's pulse and assess its future health. It's part of a broader Pentagon effort to master the societal and cultural elements of war—an effort that even many in the Defense Department believe is deeply flawed. First step: mine Twitter feeds for indications of upset.

Tags: Sensors

New scanner allows liquids back into aircraft cabin baggage

PhysOrg.com, 19JAN2012

What makes INSIGHT100 special is the capability of identifying explosives unambiguously inside opaque bottles such as coloured plastic shampoo containers, or green glass wine bottles. The INSIGHT100 system uses a proprietary technology called Spatially Offset Raman Spectroscopy (SORS). Recently, the European Commission agreed to relax the limit on liquids by introducing new screening measures from April 2013.

Tags: Sensors, Pattern recognition

STEM

Hands-on learning, mentoring keys to 'diversifying science'

PhysOrg.com, 19JAN2012

Those valuable lessons—the thrill of discovery and the joy of having a caring mentor—served as the foundation for a program Losick created at Harvard that is now considered a national model. IDEAS (Increasing Diversity and Educational Access to Science) is designed to address a problem Losick has seen in his classes as well as in national statistics: Many students who enter college with the intention of majoring in science fail to do so. [About Dr. Losick](#)

Tags: STEM ■

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